NPN 9 GHz wideband transistor VN054

FEATURES

. Very high power gain
. Low noise figure
. High transition frequency
. Emitter is thermal lead
. Low feedback capacitance.

APPLICATIONS

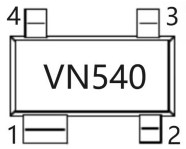
. RF front end
. Wideband applications, e.g. analog and digital cellular telephones, cordless telephones (PHS, DECT, etc.)
. Radar detectors
. Pagers
. Satellite television tuners (SATV)
. High frequency oscillators.

DESCRIPTION

NPN double polysilicon wideband transistor with buried layer for low voltage applications in a plastic, 4-pin dual-emitter SOT143B package.

PINNING

PIN	DESCRIPTION
1	collector
2	emitter
3	base
4	emitter



Top view MSB842

Marking code: P5*

* = - : made in Hong Kong
* = p : made in Hong Kong
* = t : made in Malaysia

Fig.1 Simplified outline SOT143B.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	_	_	20	V
V_{CEO}	collector-emitter voltage	open base	—	—	15	V
I_C	collector current (DC)		—	120		mA
P_{tot}	total power dissipation	T_s < 103 ℃	_	_	400	mW
h_{FE}	DC current gain	I_C = 20 mA; V_{CE} = 6 V; T_j = 25℃	60	120	250	
C_{re}	feedback capacitance	I_C = 0; V_{CE} = 8 V; f = 1 MHz	—	0.5	—	pF
f_T	transition frequency	I_C = 40 mA; V_{CE} = 8 V; f = 1 MHz; T_{amb} = 25 ℃	—	9	—	GHz
G_{max}	maximum power gain	I_C = 40 mA; V_{CE} = 8 V; f = 900 MHz; T_{amb} = 25℃	_	18	—	dB
F	noise figure	I_C = 40 mA; V_{CE} = 8 V; f =900 MHz; T_{amb} = 25℃	_	1.9	—	dB

CAUTION
This product is supplied in anti-static packing to prevent damage caused by electrostatic discharge during transport and handling.

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LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{CBO}	collector-base voltage	open emitter	-	20	V
V_{CEO}	collector-emitter voltage	open base	-	15	V
V_{EBO}	emitter-base voltage	open collector	-	2.5	V
I_C	collector current (DC)		-	120	mA
P_{tot}	total power dissipation	T_s < 103 ℃; note 1; see Fig.2	-	400	mW
T_{stg}	storage temperature		-65	+150	℃
T_j	operating junction temperature		-	150	℃

Note

1. T_s is the temperature at the soldering point of the emitter pins.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}s}$	thermal resistance from junction to soldering point	350	K/W

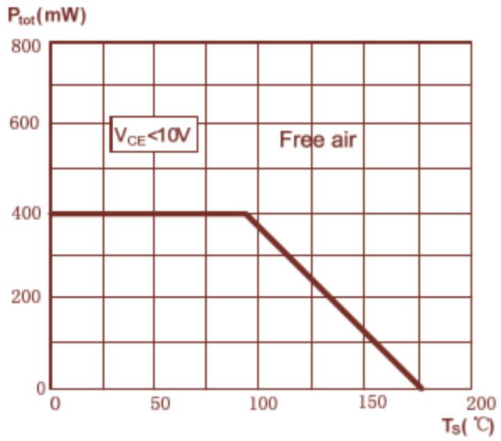

Fig.2 Power derating curve.

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CHARACTERISTICS

T_j = 25 。C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
$V_{(BR)CBO}$	collector-base breakdown voltage	I_C = 2.5 μA; I_E = 0	20	—	—	V
$V_{(BR)CEO}$	collector-emitter breakdown voltage	I_C = 1 mA; I_B = 0	15	–	—	V
$V_{(BR)EBO}$	emitter-base breakdown voltage	I_E = 2.5 μA; I_C = 0	2.5	–	—	V
I_{CBO}	collector-base leakage current	I_E = 0; V_{CB} = 6 V	–	–	50	nA
h_{FE}	DC current gain	I_C = 20 mA; V_{CE} = 6 V; see Fig.3	60	120	250	
C_c	collector capacitance	$I_E = i_e$ = 0; V_{CB} = 8 V; f = 1 MHz	–	0.9	—	pF
C_e	emitter capacitance	$I_C = i_c$ = 0; V_{EB} = 0.5 V; f = 1 MHz	–	2.0	—	pF
C_{re}	feedback capacitance	I_C = 0; V_{CB} = 8 V; f = 1 MHz; see Fig.4	—	0.5	—	pF
f_T	transition frequency	I_C = 40 mA; V_{CE} = 8 V; f = 1MHz; T_{amb} = 25 ℃; see Fig.5	—	9	—	GHz
G_{max}	maximum power gain; note 1	I_C = 40 mA; V_{CE} = 8 V; f=900MHz; T_{amb} = 25℃; see Figs 7 and 8	–	18	—	dB
$\lvert S_{21}\rvert^2$	insertion power gain	I_C = 40 mA; V_{CE} = 8 V; f=900MHz; T_{amb} = 25℃; see	—	16	—	dB
F	noise figure	IC = 10 mA; V_{CE} = 8 V; f =900 MHz; Tamb = 25℃; see	–	1.3	—	dB
		IC = 40 mA; V_{CE} = 8 V; f =900 MHz; Tamb = 25℃; see	—	1.9	—	dB
P_{L1}	output power at 1 dB gain compression	I_C = 40mA; V_{CE} = 8 V; f=900MHz; $Z_S = Z_L$= 75R; Tamb = 25℃;	–	21	—	dBm
ITO	third order intercept point	I_C = 40mA; V_{CE} = 8V;f_p=900MHz; f_q=900MHz; R_L=50R; Tamb=25℃;	—	34	—	dBm

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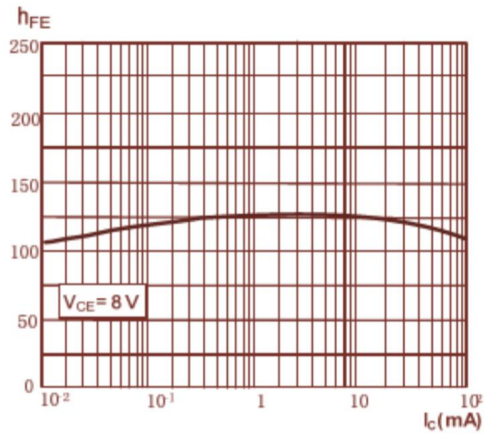

Fig.3 DC current gain as a function of collector current; typical values.

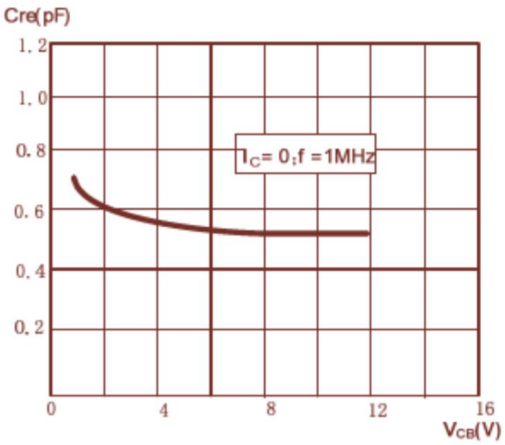

Fig.4 Feedback capacitance as a function of collector-base voltage; typical values.

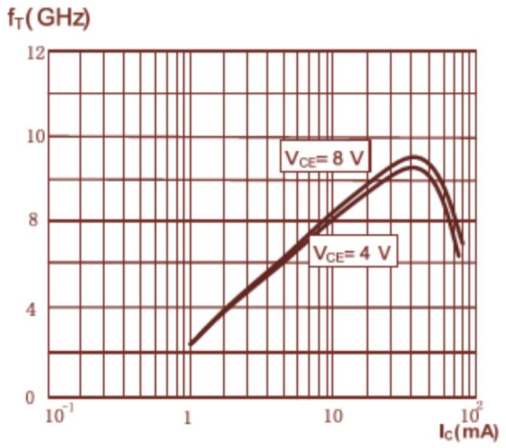

Fig.5 Transition frequency as a function of collector current; typical values.

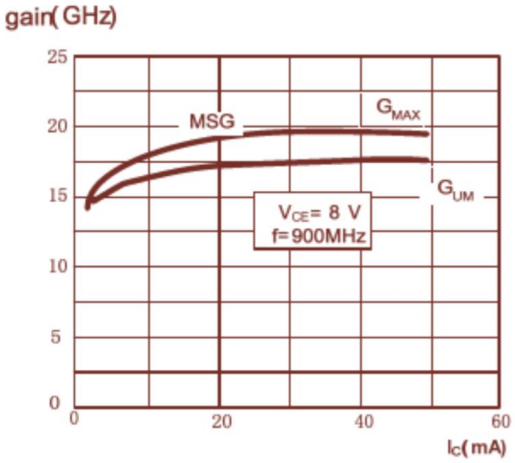

Fig.6 Maximum stable gain as a function of collector current; typical values.

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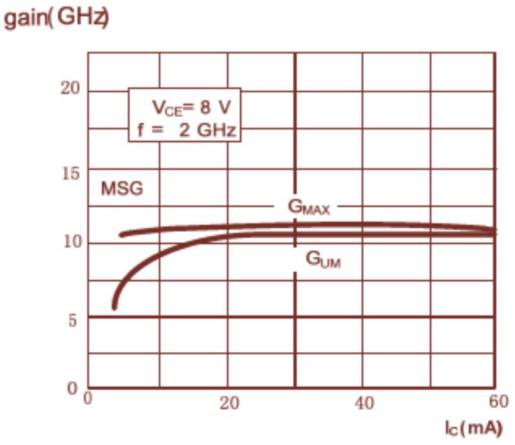


Fig.7 Gain as a function of collector current; typical values.

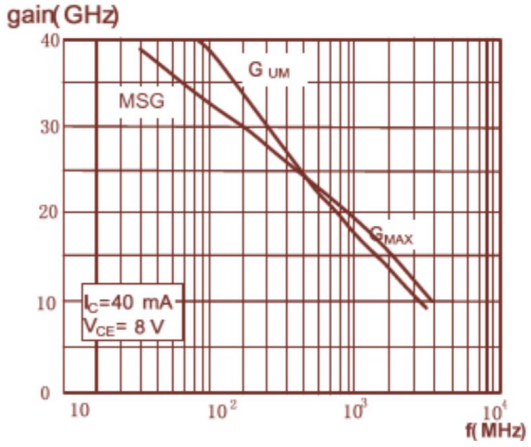
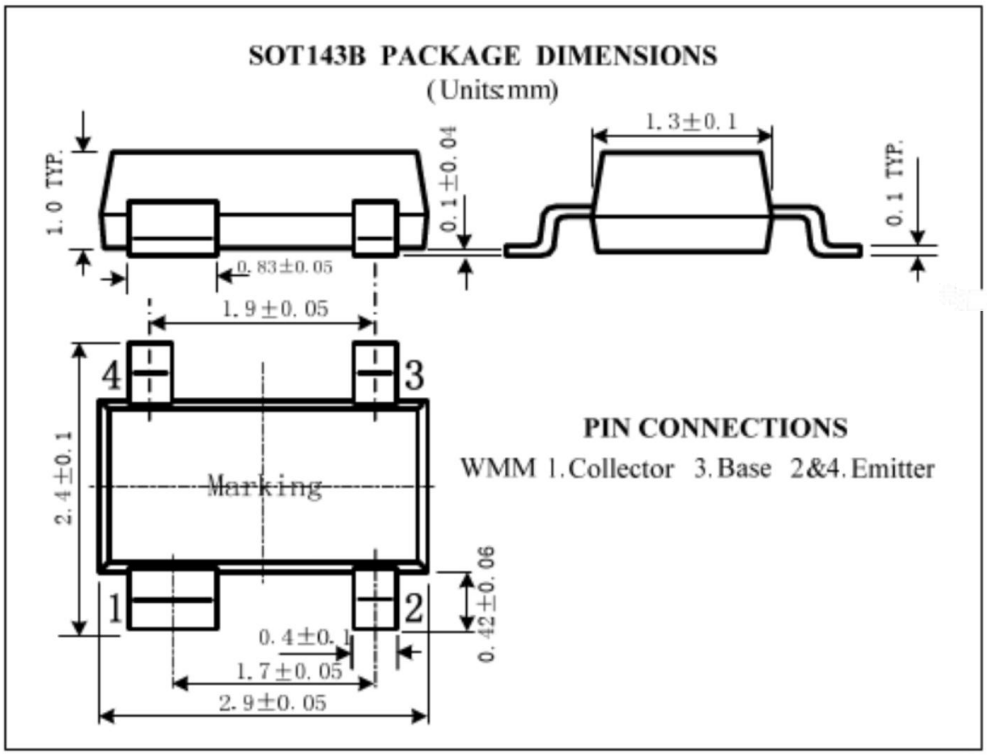


Fig.8 Gain as a function of frequency; typical values.

PACKAGE OUTLINE

Plastic surface-mounted package; reverse pinning; 4 leads **SOT143B**



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